SYSTEM TEST PHASE IA REPORT

for the

Radiosonde Replacement System (RRS)

October, 2004

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service/Office of Operational Systems
Field Systems Operations Center/Test and Evaluation Branch

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1.0 INTRODUCTION

The National Weather Service (NWS) will transition from the current radiosonde system to the Radiosonde Replacement System (RRS) to collect and process upper air data using modern technology. The RRS will be nationally deployed after the government successfully completes a series of tests, the last two of which will be the System Test (ST) and the Operational Acceptance Test (OAT).

Three previous developmental tests (designated as ST Phase 0, ST Phase 0.1, and ST Phase 0.2) were conducted as "dry runs" for the formal ST. These tests document system problems as System Issue Reports (SIRs) for resolution to optimize a successful, formal ST.

The Office of Operational Systems, Field Systems Operations Center, Test and Evaluation Branch (OPS24) conducted the first of three phases for ST, Phase IA, for the RRS with analytical support from OPS11, OPS22, OS7, the National Centers for Environmental Prediction (NCEP), and the National Climatic Data Center (NCDC). In addition, logistic support was provided by four Continental United States (CONUS) Regional Maintenance Specialists (RMS'), the NWS Training Center (NWSTC), the National Logistic Supply Center (NLSC), and the National Reconditioning Center (NRC). The ST Phase IA began on May 24, 2004 and ended on July 2, 2004, as planned. This report documents the test results and recommendations of ST Phase IA.

[Note: Prior to beginning the ST Phase IA, the application used by OPS23 to record problems was changed from Clear Quest (used during pre-ST IA testing) to Test Track Pro (used during ST IA testing). During the changeover, emphasis was placed on the operational Impact of a problem rather than implementation Priority. Definitions of the Impact categories used as well as implementation Priorities are provided in Attachment 1.]

2.0 OBJECTIVES

Attachment 2 lists the objectives for ST Phase IA and the evaluation method employed. These objectives were taken from Sections 1.3 and 1.4.1.1 of the System Test Plan for the Radiosonde Replacement System (RRS), dated July, 2003. (Note: Some of the objectives were expanded from how they were first presented in the Plan.)

All abnormalities (software, hardware, or documentation) observed during test conduct, were documented by SIRs and were provided to the RRS Test Review Group (TRG) for adjudication. The TRG prioritized all SIRs and determined if they warranted being submitted to the RRS Configuration Control Board (CCB).

3.0 CONSTRAINTS

The RRS ST Phase IA was conducted with the following constraints:

a. The RRS ST Phase IA was directed by the RRS Program Manager to began with the outstanding Impact 1 and 2 SIRs (itemized in Table 1) not implemented in the RWS software: (Note: Impact 1 prevents a successful sounding; Impact 2 prevents a successful sounding, but there is a reasonable work-around.)

Table 1 - Open Impact 1 and 2 SIRs at Start of ST Phase IA

SIR #	Impact*	Priority*	Summary
2163	I1	P5	No GPS during baseline even though the GPS status window indicated 10 matches.
2164	I1	P5	Rejected radiosondes - chipped paint. (Tom Roberts indicated we were to use radiosondes with paint problem.)
2238	I2	P2	TRS #7 initialization failed.
2273	I1	P2	Lost control of TRS.
2287	I1	P1	Rejected radiosonde for loose hygristor in hygristor can.
2294	I1	P2	Verification of wind selection process
2295	I1	P2	GPS winds calm in Stratosphere.

* Refer to Attachment 1 for a definition of the Impact and Priority values

b. The RRS Program Manager further directed the ST Phase IA to use any Sippican radiosondes found to have scratches on the temperature sensor rather than rejecting the radiosonde. The reason for this decision was an envisioned shortage of radiosondes with which to complete the ST Phase IA.

c. The Solar Radiation Correction algorithm was not implemented.

4.0 TEST CONDUCT

The RRS ST Phase IA began on May 24, 2004 with a Test Readiness Review at which the respective RRS Contracting Officer Technical Representatives (COTRs) certified the OPS24 test RRS Workstation Subsystem (RWS) at NWS Headquarters (WSH) and the two RRS' (Systems 6 and 7) located at the Sterling Research and Development Center (SR&DC), and declared the systems were ready to begin formal system testing.

The start of the ST was delayed due to a defective RWS Compact Disk (CD) and no documentation. The CD containing the RWS application software provided to OPS24 by

OPS23 during the Test Readiness Review was discovered to be defective (i.e., needed files were missing) prior to commencing the software installation. The CD was recreated–delaying the start of ST by 3 hours. In the mean time, technical documentation [Engineering Handbook (EHB) 9-series] was not provided to OPS24 by OPS12 until the afternoon of May 24, 2004.

After an initial problem (i.e., steps missing) with the EHB 9-904 procedures for preforming a "ghost imaging process" and RWS software installation, the RWS software was loaded successfully on the OPS24 RRS test system at WSH four hours after the Test Readiness Review. ("Ghost imagining" is a process of replicating the hard drive contents of a computer on another computer for the purpose of synchronizing contents.) Once the 'ghosting" was completed at WSH, OPS24 began validating the RWS requirements.

The RWS software was loaded on the SR&DC RRS Systems 6 and 7 by George Montenegro (Western Region RMS) and Paul Rockwood (OPS22) uneventfully on Tuesday, May 25, 2004. John Uhlman (OPS11) was present to document errors in the EHB 9-904. Both RRS Systems were used for testing. Refer to Attachment 3 for SR&DC RRS Systems 6 and 7 test configurations.

Once the new software load (1.0.3.3) was installed at the SR&DC, hardware checkout tests were performed on the Telemetry Receiving Subsystem (TRS) and the Signal Processing Subsystem (SPS) as well as a checkout of the Offline Maintenance Suite (OMS) application. It was discovered the OMS application no longer tested the RRS Signal Processing System (SPS). Investigation revealed OPS11 had agreed with Sippican's request to change the SPS-RWS interface baud rate from 9600 to 19200 to assist Sippican in troubleshooting a carrier noise ratio problem. But, OPS11 failed to notify OPS23 to change the OMS software accordingly. This inconsistency will be corrected in the next OMS and SPS firmware builds.

Different sets of test procedures were performed at each location (refer to Attachments 4 and 5); however, certain administrative procedures (such as adding new users) were performed at both sites. The OPS24 test system located at the WSH [which consisted of a RWS and an External Data Pump (XDP) - a RRS hardware simulator] was used to verify administrative requirements and to perform tests requiring previously flown flight data to simulate environmental conditions. The SR&DC RRS Systems 6 and 7 were used primarily for those tests requiring "live" flights.

Attachment 6 describe the live flight schedule OPS24 documented in the RRS ST Plan and intended to follow during the ST Phase IA. However, the Stress Flight Test identified in Attachment 6 was not conducted as OPS22, OS7, NCEP, and NCDC all indicated they had sufficient data for analysis and additional flights were not needed. Attachment 7 documents the actual flights flown during the ST Phase IA.

Dual flights were flown with the Baltimore, MD/Washington, DC Weather Forecast Office (WFO--LWX). using a six-foot Styrofoam spreader bar supporting a RRS Sippican Mark II radiosonde having a NAVMAN Global Positioning System (GPS) module on one end and a Vaisala RS-80 Radio Direction Finding (RDF) radiosonde (the legacy system's radiosonde used

by LWX) on the other end of the bar. The arrangement was carried aloft by means of an 800-gram GP30 general purpose weather balloon with two parachutes and a 120-foot flight train. The balloon was usually inflated with 2250 grams of helium. The purpose of the dual flights was to obtain flight data for comparison with the legacy system.

During live flights the different balloon release methods contained in the Weather Service Observing Handbook (WSOH) 10 (sections 6.13.2.1 and 6.13.2.2) were employed depending on release point. Different release point locations (refer to Attachment 8) were used depending on test objective, weather conditions, and prevailing winds. The choice of release point (usually Release Point 1–the one closest to the LWX balloon inflation building) for each dual synoptic flight was made by LWX personnel. These locations were previously recommended by OPS22, agreed to by OPS24, and surveyed by OPS11.

Data analysis was conducted in several ways:

a. World Meteorological Organization (WMO) Coded products were transmitted to the NCEP for analysis by running the data through their atmospheric models and comparing the results with those of WFO-LWX. RRS relative humidity (RH) data was compared with those sites comprising the NWS Easter Region at the request of OPS22 to verify the RRS Sippican radiosondes were indeed exhibiting a dry RH bias as was suspected.

b. Archive flight data was sent to the NCDC for analysis and inclusion in their products.

c. Captured flight data was sent to the WSH for analysis by OPS22 and OPS23. As part of the OPS22 analysis, each flight was examined throughly as it was reworked. OPS23 used the captured data to troubleshoot software problems as they were found.

d. Performance data was recorded each day on Daily Status sheets, transferred to a spreadsheet, and analyzed by OPS24 to obtain a "running" operational availability (A_o) as well as operational performance.

Four CONUS RMS' were present (one per week), as well as an Electronics Technician from the Caribou, Maine, WFO (CAR), and participated in the evaluation of the RRS Engineering Handbooks (EHB 9-series). This evaluation consisted of ordering a specific RRS Line Replacement Unit (LRU) from the NLSC, removing the old LRU and installing the new unit using the procedures in the appropriate EHB, and resolving induced real-world problems by using the RRS Troubleshooting Manual. EHB 9-903. Attachment 9 identifies the RMS and WFO personnel present, LRU subsystems ordered and installed, and the induced faults resolved.

It was discovered, when a replacement SPS was ordered from NLSC/NRC, the SPS is shipped with whatever firmware was loaded when the item was first delivered to NLSC for stocking. NLSC does not update the SPS firmware prior to shipping the unit–the updated firmware needs to be requested from Sippican and then loaded by the site personnel. [According to OPS11, the last sentence only applies to the situation during the test phase and firmware can be obtained

from the Engineering and Acquisition Branch (OPS11). Once the production baseline is established, the SPS firmware will be available through the NLSC.] The SPS unit received had firmware version 2.4 loaded instead of version 2.8. Since OPS24 did not have access to a floppy disk containing SPS firmware version 2.8 (OPS22 person with the disk was on travel and there was no convenient way to obtain the firmware from OPS11 at the time), the original SPS was reinstalled and the received unit was returned to the NLSC.

5.0 CONCLUSIONS

ST Phase IA conclusions are supported by the following examination of the original test objectives:

a. Verify the RRS installation instructions were complete and accurate - FAILED

In accordance with the RRS ST Plan, the RRS hardware installation was not tested during the ST Phase IA as the hardware had been previously installed. The RRS hardware installation will be tested during the ST Phase II at the WFO-LWX.

The initial RWS software CD delivered to the OPS24 during the Test Readiness Review had needed files missing. OPS23 took three hours to replace the CD. Once this was corrected, the RWS software was installed at WSH with problems using the EHB 9-904 technical manual. EHB 9-904 was incomplete and contained invalid information. The document was extensively "red-lined" for OPS12. The next day the software was reloaded per a test procedure in which the RWS application was placed in an alternate directory rather than the default directory. Following the steps in the EHB 9-904, the system crashed. No problems were experienced during the RWS software installation on either SR&DC RRS system as the red-lined copies of the procedures were used. Red-lined comments were either forwarded to OPS12 or were actually witnessed by OPS12 personnel at the SR&DC.

b. Validate RWS Requirements - FAILED

All respective tests were completed on the OPS24 test system and the SR&DC RRS systems. Where appropriate, tests were conducted with various user accounts (Site Administrator, Observer, or Trainee) to verify only certain functions were allowed for specific user types.

Based on a review of the SR&DC and WSH Test Checklists and the RRS Test Requirements Matrix (dated 5/26/04), all 398 RWS requirements contained in the RWS Software Requirements Specification (SRS) were tested, except as noted in Table 2, below.

Table 2 - Untested RWS SRS Requirements

Matrix Item #	SRS Para #	Requirement	Notes & Questions
10	4.4.1	The RWS shall store Radiosonde Calibration Data supplied on media.	**NA - Intermet radiosondes only**
204-208, 210	6.4.2.x 6.5.2	(multiple requirements: The RWS will support an upgrade installation of the software.)	"Update" requirement **deferred** to ST Phase IB
346	6.7.2.16.2	The RWS shall enable the observer to view and print Radiosonde Calibration Data based on radiosonde serial number.	**NA - Intermet radiosondes only**

Four SIRs were written against failed requirements (refer to Table 3) during test procedure execution. The SIRs dealing with an inability to reproduce specific check messages may be the result of inappropriate simulation files for the XDP. OPS23 has resolved the problem which generated SIR 2298 and it will be in the next release of the RWS software. One hundred and eight additional SIRs were observed during simulated and live operations as well as during data/product analysis. These additional SIRs are documented in Attachment 10.

Table 3 - SRS Requirements Failing ST Procedures

SIR #	SRS Para #	Summary	Impact/Priority
2298	6.4.2.1	Fatal Error during Installation	I1/P2
2319	6.7.2.1.2.4	Overlay Plot line connecting cross marks are only displayed for previous flights	I4/P3
2321	6.7.2.5.2	Observer cannot mark wind speed and direction cells in Processed Tabular Display	I3/P2
2347	4.19.1	Flight Summary has termination pressure as N/A but WMO levels indicated an actual pressure value	I2/P2

c. Verify RRS "live" flight performance with special solo flights and dual synoptic flights - CONDITIONALLY PASSED (problem with balloon gas amount)

A total of 84 upper air soundings were flown from the SR&DC between May 26 and June 25, 2004. Of the 84 flights, 74 were considered to be valid flights - i.e., a valid flight is one that was not terminated by the observer for test purposes. Sixty-three of the valid flights were flown as a dual flight with the WFO Baltimore, MD/Washington, DC (LWX). The dual flights were flown as described earlier in Section 4.0. The average flight time was 100 minutes. Of the 63 dual flights, 56 were flown as 00Z and 12 Z synoptic flights. The remaining seven dual flights were special flights. WMO coded products were transmitted from the two RRS systems at the SR&DC and compared by NCEP with the products transmitted from LWX. Archived flight data were sent to the NCDC via File Transfer Protocol (ftp) for analysis.

Of the 74 valid flights 53 (71.62%) reached 10 hecto-Pascal (hPa) or less. The number of flights not reaching 10 hPa was due to trying to adjust gas amounts for the GP30 balloon during dual flights. LWX had specific requirements for ascension rates which conflicted with gas amounts for maximum altitude (i.e., minimum pressure).

The average termination pressure for the 74 valid flights are shown in Table 4:

Table 4 - Average Flight Termination Pressure

	12Z	Special	00Z
RRS System 6	12.12 hPa	10.07 hPa	10.71 hPa
RRS System 7	12.28 hPa	10.14 hPa	92.39 hPa

The discrepancy with the 00Z average termination between System 6 and System 7 is due to a flight only monitored by System 7 that was terminated by the RWS application software as the balloon was exiting a thundercloud at 911 hPa, 3.5 minutes into the flight. This was one of the Operational Impact 1 SIRs.

The average slant range for the 74 valid flights was 64887.29 meters for RRS System 6 and 58263.12 meters for RRS System 7. The discrepancy between the slant ranges is due to more flights being monitored by System 7 than System 6.

The individual flight summary logs documenting each flight for SR&DC RRS Systems 6 and 7 are contained in Attachment 7.

d. Collect performance data for evaluating meteorological algorithms (including solar radiation correction) and generation of coded messages - FAILED

During the 74 valid flights, OPS22 and OPS24 personnel performed an initial, real-time analysis of the flight data. Copies of all flight data and logs were captured and sent to the WSH for detailed analysis by OPS22 and OS7 personnel. The majority of SIRs found were during the detailed data analysis. The most significant result was a dry RH bias at high altitudes. The legacy system for the Eastern Region reported RH readings of 8-10% RH while the RRS reported <1% RH. NCEP had the following comment:

> "... the 69990 [RRS System 7 at SR&DC] statistics look fairly good below 700 hPa. From 699 to 300 hPa, roughly 10% of the RH observations are below 1%, which is very suspect value and believed to be wrong by individuals here at NCEP that were shown the results. From 299 hPa on up, the 69990 RH values are below 1% over 30% of the time! The bias from 699 to 300 hPa versus the NCEP guess is rather low –20.8%. It is good that the test radiosonde is giving us more vertical resolution, but the dry bias above 700 hPa will cause negative impact on NCEP models. Other users of the radiosonde data such as climatologists will no doubt be displeased with the low RH bias."

The RWS software load provided by OPS23 to OPS24 for the ST IA did not have the Solar Radiation Correction algorithm implemented.

Attachment 11 contains a summary of OPS22 and OS7's evaluation of RWS meteorological algorithms and coded messages.

e. Exercise all RRS subsystem interfaces to other NWS systems [e.g., the Advanced Weather Interactive Processing System (AWIPS)/Local Data Acquisition Device (LDAD)] - PASSED

The systems tested during the ST IA were connected by both Local Area Network (LAN) and telephone lines to the test AWIPS system [NWS Headquarters Modernization Test and Integration AWIPS, WFO (NMTW)] at WSH. From NMTW, the RWS products were transferred to the Test AWIPS Network Control Facility (TNCF), and then to the NWS Telecommunications Gateway (NWSTC) for transmission to the NCEP. No problems were encountered with the RWS to NMTW circuit. This circuit was also successfully tested during a backup test at WSH using the NWS Headquarters Development AWIPS (NHDA). This backup product transmission capability was tested at the WSH in a simulated mode. However, during a time when the network was down for routine maintenance, 00Z synoptic products from a live flight were successfully transmitted by phone line to the backup WSH TNCF running on the NHDA computer and then to the NCEP. Products to NCDC were transmitted later after the network was back up.

f. Collect data for use during the Reliability, Maintainability, and Availability (RMA) analysis - PASSED

Poor quality control of the radiosondes was observed. The most evident problem was a scratched thermistor on most of the temperature sensors. As the RRS Test Team was directed to use radiosondes with scratched thermistors, a tally of incidences was not maintained.

Two radiosondes were rejected as "bad out of the box" since they could not be baselined.

Problems were observed with three TRS subsystem coefficients having the wrong value even though both Systems 6 and 7 were certified by OPS11 as ready to begin the ST.

Periodically, Global Positioning System (GPS) data would not be received from the SPS. Initial analysis indicates a SPS firmware problem. A second SPS firmware problem was observed while attempted to perform SPS diagnostics using the OMS application. It was later discovered, Sippican (with OPS11's approval) changed the interface baud rate without informing OPS23 so the software could be changed accordingly.

Twelve Engineering Management Reporting System (EMRS) reports were generated (refer to Attachment 12) during the ST IA for hardware problems (an associated hardware SIR was also written).

The time equipment was turned on and time it was available for operational use was recorded for each of the following RRS subsystems:

1. The radiosonde,
2. The TRS,
3. The SPS,
4. The RWS computer, and
5. The RWS application.

The RRS Availability is summarized in Table 5: (Note: Since the RRS can operate without the RSOIS, it was not included in the calculations)

Table 5 - RRS Availability During ST Phase IA

	Radiosonde	TRS	SPS	Workstation Computer	RWS Software*	System A_o
System 6	99.57%	96.29%	92.69%	100%	100%	97.88%
System 7	99.81	99.91%	99.1%	100%	98.6%	99.66%

HQ System	NA	NA	NA	100%	98.14%	99.07%

* The availability discrepancy between System 6 and System 7 application software is due to problems being experienced on System 7 which were not seen on System 6 because System 6 was being used for EHB evaluation by RMS personnel and was not monitoring an upper air flight at the time.

Calculations show the RRS, during the six-week ST Phase IA, to have an overall Operational Availability (A_o) of 98.81%. The most reliable subsystem is the RWS computer (100%); the least reliable, the SPS firmware (92.69%).

g. Verify product accuracy and throughput to NCEP and NCDC - Accuracy, FAILED; Throughput, PASSED

Products were successfully transmitted from both RRS Systems 6 and 7 to the NCEP and flight archive data files were "ftped" to NCDC. However, there were problems in the accuracy of content generation discovered through subsequent data analysis by OPS22, NCEP, and NCDC.

1) The following comments are extracted from an NCEP e-mail dated July 7, 2004 and edited for readability:

"**The Climatic Prediction Center (CPC), the Tropical Prediction Center (TPC) and the Environmental Modeling Center (EMC) have strong concerns about the low relative humidity problems observed in the RRS Sippican Mark II radiosonde having a NAVMAN Global Positioning System (GPS) module**. The CPC and others in the climate field have concerns about the temperature noise in the stratosphere. Considering these problems will have negative impact on operations and research, the CPC needs to know if these problems will be fixed before implementation of the new radiosondes.

"**It is the perception of the CPC these proposed radiosonde replacements are a disaster and should not be implemented operationally unless the significant problems are solved**. They not only will affect the historical record and the stratosphere, but the RH problem is a fundamental weather, analysis, model requirement which must be corrected.

"**The TPC is strongly opposed to replacement of the current generation of radiosondes with the test instruments** you've [i.e., NCEP] described. As you [NCEP] stated, the significant dry bias in the mid- to upper-troposphere, seen in the tests for station 69990 (SR&DC RRS System 7), will surely have a negative impact on the NCEP model forecasts. An accurate specification of the humidity variable (even at mid- to upper-tropospheric levels) is particularly crucial for tropical modeling and forecasting."

2) After each flight, all archive data was transmitted to the NCDC. Some minor problems were experienced "ftping" files to NCDC:

(a) NCDC needed to request retransmission of "ksta04052717.zip." When they attempted to unzip the original file, they received an error message. The re-transmitted file worked successfully. A comparison of the file sizes showed the original file was smaller. According to NCDC, "This happens a small percentage of the time with MicroArt data, too. Why it happens is ... possible a data overrun, transmission problem."

(b) File "ksta04061817.zip" was flagged by NCDC because the date/time of the BUFR and H-file said it was 18Z. A closer look at the release time showed it to be 1734Z (which the RWS , rounds) to 18Z. NCDC indicated their date/time checks may be a little tight, but its purpose was to catch obvious errors.

(c) On a minor scale, one filename was mis-keyed as "ktsb" instead of "kstb." NCDC corrected the problem by renamed the file and ingested it successfully.

h. Determine the maturity state of the RRS - FAILED

The firmware contained in the RRS hardware was more stable than with previous testing. However, there is still a problem with radiosonde quality control (i.e., scratched thermistors, etc.) and the radiosonde solar radiation correction.

In measuring the state of the RWS software maturity, between May 24, 2004, to July 2, 2004, a total of 158 SIRs were observed. Forty-three SIRs were either duplicates, withdrawn, or consisted of questions about software performance, leaving an active total at the end of the test period of 115 SIRs. Ninety-one SIRs were software problems; 13 were hardware problems; and 10 involved the technical documentation. Attachment 10 is a matrix of RRS subsystem, SRS paragraph number, and associated SIR. Despite the number of SIRs written, the RRS Test Team agreed the RWS application was more robust and stable than previous versions of the software.

Of the 115 active SIRs, 52 were considered by the RRS Test Review Group (TRG) to have an Operational Impact of 1 - meaning an upper air sounding could not be completed and there was no work around. Forty-six SIRs were against the RWS software; three SIRs were hardware related; and three SIRs were against the technical documentation. The majority of the 46 Impact 1 software SIRs fell in the areas of data generation and product coding as well as a lack of check messages alerting the observer to potential problems with the flight or with the data. Data were analyzed by OPS22, OS7, the NCEP, and the NCDC.

Eighteen SIRs were considered by the TRG to have an Operational Impact of 2 - meaning an upper air sounding could not be completed, but there was a reasonable work-around. Thirteen SIRs were against the RWS software; one SIRs was hardware related; and four SIRs were against the technical documentation.

Seventeen SIRs were considered by the TRG to have an Operational Impact of 3 -

meaning an upper air flight was completed, but there was degradation of data.

Twenty-three SIRs were submitted with an Operational Impact of 4 - meaning there was a degradation of system capabilities, but the data was not affected.

Five SIRs fell into the area of Operational Impact 5 - meaning there was minimal impact on an upper air sounding or it was a feature that would be nice to have.

As mentioned above, 115 new problems were identified during the ST Phase IA by the RRS Test Team. Refer to Table 6 for a comparison with the SIRs identified during the previous developmental testing (designated as ST Phase 0, ST Phase 0.1, and ST Phase 0.2):

Table 6 - Cumulative SIRs Found During Testing

Test Phase	Impact 1	Impact 2	Impact 3	Impact 4	Impact 5	Total
ST Phase 0	4	25	6	7	0	42
ST Phase 0.1	0	78	21	9	0	102
ST Phase 0.2	32	13	24	23	4	96
ST Phase IA	52	18	17	23	5	158*
Totals	88	134	68	62	9	363**

* 158 SIRs were written; however, 43 SIRs were either duplicates or withdrawn leaving 115 new SIRs.
** This total only includes SIRs found during testing proper; it does not include SIRs written between test phases.

The 70 Impact 1 and 2 SIRs observed during ST Phase IA reflect the increased data analysis performed by OPS22, OS&, NCEP, and NCDC. (See Section 6.0, Recommendations)

i. Determine the status of the draft user and technical documentation - User Documentation, PASSED; Technical Documentation, FAILED

The draft Radiosonde Replacement System (RRS) Workstation User Guide dated April 2004 was successfully used by both upper air Observers (OPS22) and RMS personnel at the SR&DC during the ST Phase IA. In particular, the balloon release procedures as well as what to do when specific anomalies were observed were found to be correct and helpful. However, there was some confusion on the procedure to follow for live flights as the text assumed some familiarity with legacy system upper air operations. All of the text examples were written from the standpoint of using the training/simulated flight mode. There was no clear cut procedure to follow if a problem was experienced during an actual live flight. Several persons mentioned it would be helpful to have a Quick Reference Guide for live flights.

As part of the ST, four Regional Maintenance Specialist (RMS') were at the SR&DC to assist in technical documentation (EHB 9 series) evaluation and troubleshooting exercises on RRS System 6. The technical documentation was evaluated by having each RMS order a specific RRS Line Replaceable Unit (LRU) from the NLSC and/or NRC and then use the manuals to perform the removal and replacement. In addition each RMS was presented with 2-4 induced hardware problems and were to use the RRS troubleshooting manual (EHB 9-903) to isolate the problem. All system faults induced were real-world faults seen at the SR&DC in the past two years.

All four of the RMS' found the technical documentation hard to use. While the EHB 9-series contains useful information, it is "scattered" throughout the series and difficult to locate when needed. In addition, EHB 9-903, RRS Fault Analysis, does not contains adequate procedures to troubleshoot hardware problems to some LRUs, while going into great detail on how to isolate problems within the TRS air condition system which is itself listed as an LRU.

The following is a quote from the Southern Region RMS (from an e-mail) and is typical of what each RMS expressed:

> "[EHB 9-903] Section 3.2.7 Air Conditioner - The A/C is an LRU. [You] don't need to know about locating and repair leak's or replacing motors or compressors or replace tubing or re-braze joints.
>
> "... It's my opinion that the Tech Manuals need a lot of attention. When I first sat down to a Workstation last Monday, after a fault had been inserted, I felt lost. Where do I start?"

All four of the RMS' had previously attended the NWS Training Center's RRS Maintenance Course.

All of the RMS' expressed concern over the fact the manuals refer to a "target antenna" being required for troubleshooting and alignment, but there are no management plans to provide a target antenna as part of the RRS suite.

Another concern of theirs was remote upper air sites and how the sites would download security updates as well as maintenance documentation since they only have a 56K modem and no network connection.

j. Determine compliance of the RWS application with the Americans with Disabilities Act (ADA); Section 508, Technical Standards Checklist - FAILED

> As tested during the ST Phase IA, the RWS application does not comply with the Americans with Disabilities Act (ADA); Section 508, Technical Standards Checklist. Persons with disabilities are prohibited from:

a. Editing the coded messages using the on-screen keyboard.

b. Marking and editing data in the magnified area when using the Windows Magnifier.

c. Easily understanding the Windows Narrator.

These discrepancies were documented in SIR 2387.

k. Verify the Radiosonde Replacement System Project Agreement document minimum RRS performance requirements

1. **Percentage of all naturally terminating test flights processing data above the 400 hPa level is equal to or greater than 95%.** - PASSED

Of the 74 valid flights flown during the ST Phase IA, 73 (98.65%) flights naturally terminated above 400 hPa. The one flight that failed to reach 400 hPa appears to have had either a radiosonde failure or a balloon failure as the flight was passing through a "thunder cloud" at 912 hPa during a 00Z dual flight sounding.

2. **Percentage of all naturally terminating test flights processing data above the 10 hPa level is equal to or greater than 60%.** - PASSED

Initially, it was believed RRS had failed this performance requirement as only 24 (32.43%) of the 74 flights went above 10 hPa. However, subsequent analysis indicated the balloon burst algorithm was not working during ST-1A and was reporting flights terminating 0.5 to 1 hPa too early. Taking this into account, **the RRS actually passed this requirement as 71.62% of the flights (53) reached or exceeded 10 hPa**. This is despite Sixty-three of the 74 valid flights were flown as dual flights with LWX (who had specific requirements for ascension rates) and therefore, we could not fully evaluate this requirement due to the method of conducting dual flights. It was necessary for the OPS22 personnel to experiment with balloon gas amounts to meet LWX's requirements while trying to obtain maximum altitude using a GP30 balloon with a spreader bar and two radiosondes attached.

3. **Percentage of all test flights with 90% of wind and temperature values passing NCEP quality control tests will be 97% or greater**. - FAILED

The RRS failed this performance requirement. NCDC put the BUFR and ASCII levels data through their AIRS Quality Control (QC) application and reported: "A look at the summary stats and index scores shows the RRS data scoring higher than the MicroART. The %LO_SUPR's was 3 times higher, DPD>50 was higher, and % DEL_ERR (winds) was higher. I'm sure the wind increase is due to the QC marking one of each dupe levels as highly suspect."

OPS22 provided the following translation of the NCDC comment:

"In summary, NCDC is flagging the ST data for:

-High number of super-adiabatic lapse rates (as reported by the radiosonde)
-High number 1% or less RH values (as reported by the radiosonde)
-High number of duplicate pressure levels (RRS s/w related)

"The last NCEP web page shows that **the U/A thermodynamic error index score for the [RRS] ST flights is nearly three times worse (a score of zero is a perfect score) than the corresponding Sterling WFO Vaisala flights**. A check of the national average March '03 to April '04 shows that the ST flights were also well above this value (~2.5 vs 5.6) as well.

"Even if the errors caused by duplicate levels are removed from the data assessment, **the thermodynamic data index score from the RRS is still far above the national average**."

4. Percentage of all test flights transmitting messages within three hours of balloon release is 95% or greater. PASSED

All products were transmitted as they were generated. All archive files were ftped within 20 minutes of flight termination. The delay in ftping the NCDC archives was due to "test paperwork" documenting the flight and archiving the associated video tape for the flight. [Note: All flights were videotaped in their entirety from System 7]. Therefore, the percentage for this requirement is 100%.

6.0 RECOMMENDATIONS

Based on the review of the RRS ST test results and conclusions, OPS24 is recommending the following items be addressed prior to a start of the ST Phase IB:

1. All Impact 1 and 2 SIRs should be fixed and validated by OPS23. ST IA was directed to begin with outstanding Impact 1 and 2 SIRs; however, since ST IB is a more of an operational test, there should not be any major operational impact problems open.

2. OPS23 should have better quality control of deliverable CDs. Almost every time a new software build has been delivered to OPS24, there have been problems with either files missing or the software cannot be loaded as delivered.

3. OPS22 should re-examine the RWS SRS failed requirements (Table 3) during ST Phase IB to determine if the failure has been resolved–especially those failures which generated Impact 1 and 2 SIRs. Table 7 itemizes the Impact 1 and 2 SIRs for the failed requirements.

Table 7 - RWS Requirements to be Observed During ST Phase IB

Requirement	SIR	Impact	Priority	Description	Comments
4.19.1	2347	2	2	Flight Summary has termination pressure as N/A but WMO levels indicated an actual pressure	Failed ST IA
6.4.2.1	2298	1	2	Fatal Error during installation	Failed ST IA

4. It is recommended the 29 Impact 1 and 2 SIRs identified in Attachment 13 - as specifically having occurred at the WFO Caribou (WFO-CAR), Maine site prior to ST IA, be evaluated during ST Phase IB at WFO-CAR to ensure they were not site dependent. These SIRs were not witnessed at the SR&DC during ST Phase IA.

5. OS7 should correct and refine the accuracy of the various algorithms used to generate products. OPS23 should improve product generation by implementing all algorithm SIRs.

6. OPS23 should Improve RWS compliance with the Americans With Disabilities Act; Section 508 prior to full deployment.

7. OPS12 should correct the errors contained in the RRS technical documentation (EHB 9-series) and develop a detailed RRS fault isolation flowchart as part of EHB 9-903.

8. While the RWS User Guide was usable as is, it is recommended a Quick Reference Guide for live flights be provided to supplement the User Guide. It is suggested this supplement be something similar to OPS24's RRS Test Procedure 403, Live Flights, as an attachment to the User Guide.

9. OPS11 should provide a radiosonde for ST IB testing that meets the requirements of the NCEP and the user community (refer to Section 5.0g for user community comments).

Attachment 1 - Definition of Impact Categories and Priority Levels

Operational Impact Category	Definition
1	Prevents successful observation; no work around
2	Prevents successful observation; reasonable work around
3	Less critical degradation of data
4	Degradation of system capacities; no data affected
5	Minimal to no impact; nice to have

CCB Priority Level	Definition
1	Need immediate emergency fix
2	Include in next maintenance release
3	Include in a future maintenance release
4	Include in next major build
5	Undetermined

Attachment 2 - RRS System Test Objectives and Evaluation Methods

Objective	Evaluation Method
Verify the RRS Workstation Subsystem (RWS) application installation instructions were complete and accurate.	Successful completion of the "ghost imagining process" and RRS applications installation [RWS operating system, RWS application, and the Offline Maintenance Suite (OMS)] using the EHB 9-904.
Validate RWS System-Level Functional Requirements contained in the RWS System Requirement Specification, dated May 26, 2004.	Successful completion of the test procedure for each test case.
Verify RRS flight performance with special solo flights and dual synoptic flights with the Baltimore, MD/Washington, DC Weather Forecast Office (WFO-LWX).	Analysis and quality control checks by the NCEP and the NCDC; comparing the data with the legacy system.
Collect performance data for evaluating meteorological algorithms including solar radiation correction and generation of coded messages.	Analysis by OPS22 and OS7 subject matter experts.
Collect data for use during the Reliability, Maintainability, and Availability (RMA) analysis.	Calculated by time operational divided by time available and expressed as a percent for each subsystem, each test system, and overall.
Exercise all RRS subsystem interfaces to other NWS systems [e.g., the AWIPS/Local Data Acquisition Device (LDAD)].	Successful completion of hardware related ST test procedures and end-to-end transmission to NCEP.
Verify product accuracy and throughput to NCEP and NCDC. This will include RRS product format and data evaluation.	**NECP** will attempt to open and import RRS products into their meteorological models and perform quality control of the data. **NCDC** will evaluate archive generation and data quality for their products.
Determine the maturity state of the RRS.	Number of SIRs written overall as well as the number of Impact 1 and 2 SIRs
Determine the status of the draft user and technical documentation and assess Maintenance Actions/Fault Isolation using the OMS and the Offline Built-In-Test (OBIT) applications. [Note: The process of obtaining spare parts from the NLSC and NRC would be exercised by using both internet ordering and calling NLSC directly.]	Evaluation by the NWSTC and CONUS RMS personnel. The RMS' will use the technical documentation for troubleshooting induced problems and for the purpose of removing and replacing ordered RRS subsystems.
Determine compliance of the RWS application with the Americans with Disabilities Act (ADA); Section 508, Technical Standards Checklist	Evaluation of the Windows 2000 accessibility features (On-screen Keyboard, Magnifier, and Narrator) during a live flight.

Objective	Evaluation Method
Verify the Radiosonde Replacement System Project Agreement document's minimum RRS performance requirements.	OPS24 will collect data for OPS22 and OS7 analysis as follows: 1. Percentage of all naturally terminating test flights processing data above the 400 hecto-Pascal (hPa) level is equal to or greater than 95%. 2. Percentage of all naturally terminating test flights processing data above the 10 hPa level is equal to or greater than 60%. 3. Percentage of all test flights with 90% of wind and temperature values passing NCEP quality control tests will be 97% or greater. 4. Percentage of all test flights transmitting messages within three hours of balloon release is 95% or greater.

Attachment 3 - RRS Systems 6 and 7 Configuration for ST Phase IA

RRS System 6 Configuration

RRS Subsystem	Subsystem Line Replaceable Unit (LRU)	Version at Start of ST Phase IA	Version at End of ST Phase IA
RRS Workstation Subsystem Software		1.0.3.3	1.0.3.3
TRS - Serial Number		006	006
	System Communications Assembly	V1.29	V1.29
	Motion Control Unit[1]	V1.40	V1.40
	Scanner	V2.00Q	V2.00Q
	Receiver	V2.09	V2.09
	Console Display Unit	V3.27	V3.27
Signal Processing Subsystem (SPS) - Serial Number		005206	005206[2]
	Firmware	V2.8	V2.8
RRS Surface Observation Information Subsystem (RSOIS) - Serial Number		Not connected to System 6	
Precision Digital Barometer (PDB)		Not connected to System 6	
RRS Workstation Subsystem (RWS) - Gateway E-6000 - Serial Number		0029662484	0029662482
	Equinox Card	Model 950357-001 Serial number UT06880	[3]

1 - The MCU SN: 44330634 was replaced with SN: 415300005 as part of the EHB verification.

2 - The SPS was replaced by another unit from the NLSC. However, after installation, it was discovered to have firmware version V2.4 rather than V2.8. Since the person with the correct firmware version was on leave and the floppy disk was not available, the original SPS was replaced.

3 - When the RWS was replaced, the computer tower was not opened to record the new Equinox Card serial number.

RRS System 7 Configuration

RRS Subsystem	Subsystem Line Replaceable Unit (LRU)	Version at Start of ST Phase IA	Version at End of ST Phase IA
RRS Workstation Subsystem Software		1.0.3.3	1.0.3.3
TRS - Serial Number		007	007
	System Communications Assembly	V1.29	V1.29
	Motion Control Unit	V1.40	V1.40
	Scanner	V2.00Q	V2.00Q
	Receiver	V2.09	V2.09
	Console Display Unit	V3.27	V3.27
Signal Processing Subsystem (SPS) - Serial Number		005204	005204
	Firmware	V2.8	V2.8
RRS Surface Observation Information Subsystem (RSOIS) - Serial Number		1973	1973
	Remote Processing Unit	V1.952-2178-1.1	V1.952-2178-1.1
	Temperature/Humidity Unit	Vaisala/Handar HMP45DU	Vaisala/Handar HMP45DU
	Aspirator	R. M. Young 43408F-12	R. M. Young 43408F-12
	Wind Sensor	Vaisala/Handar 425AHW	Vaisala/Handar 425AHW
	Base Station	Not used because of fiber optic cable	
	Directional Antenna	Not used because of fiber optic cable	
Precision Digital Barometer (PDB) - Model PDB1 - Serial Number		177	177
RRS Workstation Subsystem (RWS) - Gateway E-6000 - Serial Number		0029662473	0029662473
	Equinox Card	Model 950357-001 Serial number UT06880	Model 950357-001 Serial number UT06880

Attachment 4 - WSH RRS System Test Phase IA Checklist

May 24 - July 2, 2004
(User Accounts: A = Administrator; O = Observer; T = Trainee)

#	Test No	Title	User Account	Data Set	comments	Initials	Test Date
000 Series - Installation							
1	001	RRS Installation	A	N/A		BV	5/25/04
200 Series - System Administration							
2	201	Tools File and Directory	A	N/A		HT	5/25/04
3	211	Flight Management - NCDC Archive Utility	A	N/A		HT	5/26/04
4	212	Flight Management - Flight Import and Export Utility	O/A	N/A		HT	5/26/04
5	214	Flight Management - Flight Deletion Utility	A	N/A		HT	5/26/04
6	215	Flight Management - Flight Summary Utility	O	N/A		BV/HT	5/27/04
7	220	Application Utility	A	N/A		BV/HT	5/27/04
8	221	Application - Plots Utility	A	N/A		BV/HT	5/27/04
9	231	Administration - User Administrative Utility	A	N/A		BV/HT	5/27/04
10	233	Administration - Master Station and Station Data Info	A	N/A		HT	5/28/04
11	234	Administration - Database Backup and Restore Utility	O	N/A		HT/BV	5/28/04
12	235	Administration - File Location Utility	A	N/A		HT	5/28/04
13	236	Administration - Preflight Information Utility	A	N/A		HT	5/28/04
400 Series -Evaluation of RWS Functional Capabilities							

#	Test No	Title	User Account	Data Set	comments	Initials	Test Date
14	400	GUI Checkout	O	N/A	multiple termination scenarios will be available.	HT	6/07/04
15	401	Nominal Inline Simulator Flight	T	N/A		HT/BV	6/01/04
16	401a	Editing Check Messages	O	N/A		HT/BV	6/01/04
17	402	Nominal Flight - XDP	O	N/A		BV	6/02/04
18	402a	Nominal Flight - Plots Overlay	O	N/A		BV	6/01/04
19	404	Flight Rework Capability	O	N/A		HT	6/02/04
20	405a	Special Flight Release Functions	A/O	N/A		HT	6/03/04
21	405b	Special Flight Release Functions	A/O	N/A		HT	6/04/04
22	405c	Special Flight Release Functions	A/O	N/A		HT	6/04/04
410 Series - Data Quality and Check Messages							
23	410a	Check Messages for SRS 5.1.2.6.1, 6.7.2.9.1, and 6.7.2.9.2	A	1133.mal 69102-3-1083	Test#410 CD	HT	6/04/04
24	410b	Missing Mandatory Pressure Level	O	RRS-999mb-sfc-pressure		HT	6/07/04
25	410c	Data Missing Near Possible Tropopause and Same Pressure At Times	A	69102-3-1071	Test#410 CD	BV	6/09/04
26	410d	No Tropopause Found At 500mb Or Above and No Level Within 20mb of the Surface	O	5007.mal		HT	6/08/04
27	410e	Wind Speed and Direction Changes, and Superdiabatic Lapse Rate detected	A	69102-3-1082	Test#410 CD	BV	6/09/04
28	410f	Wind Speed Exceeds 180kts	O	1039.mal		HT	6/08/04

#	Test No	Title	User Account	Data Set	comments	Initials	Test Date
29	410g	Balloon Descended and Reascended Detected	O	proclc.mal		HT	6/09/04
30	410h	Temperature Lapse Rate	O	2249.mal		HT	6/08/04
430 Series - RRS Anomalous Flight Situation							
31	430a	Missing Winds data	O	1004.mal		HT	5/26/04
32	430b	Excessive Missing data	O	1122.mal		HT	5/26/04
33	430c	Maximum Winds 132kts data	O	1006.mal		HT	5/26/04
34	430d	Maximum Winds 247kts data	O	1039.mal		HT	5/26/04
35	430e	Rapid RH changes	O	1118.mal		HT	5/26/04
36	430f	Temperature less than -80C Degree	O	1095.mal		HT	5/27/04
37	430g	Less Than 250 m/min Ascension Rate	O	1096.mal		HT	5/27/04
38	430h	Floating Balloon	O	1137.mal		HT	5/28/04
39	430i	Constant Pressure at 200 hPa	O	4001.mal		HT	5/28/04
40	430j	Constant Pressure at 600 hPa	O	4004.mal		HT	6/01/04
41	430k	Excessive Missing Pressure Data	O	1148.mal		HT	6/01/04
42	430l	Balloon Burst	O	1290.mal		HT	6/01/04
43	430m	Temperature Inversion Off Surface	O	1613.mal		HT	6/01/04
44	430n	Multiple Super Adiabatic Lapse Rates	O	2183.mal		HT	6/02/04
45	430o	Failed Temperature Sensor	O	5001.mal		HT	6/01/04
46	430p	Out of Range Temperature Spikes	O	5004.mal		HT	6/02/04
47	430q	Within Range Temperature and Pressure Spikes	O	AllSpikes.mal		HT	6/03/04
48	430r	Seven Freezing Levels	O	1655.mal		HT	6/03/04
49	430s	Negative Pressure Levels	O	4005.mal		HT	6/03/04
50	430t	Out of Range Pressure Spikes	O	4006.mal		HT	6/03/04

#	Test No	Title	User Account	Data Set	comments	Initials	Test Date
440 series - RRS Extreme Site Locations							
52	440a	Key West (KHQR), FL	A	1240m.s03		HT	6/08/04
53	440b	Riverton (KHQV), WY	A	1239m.s03		HT	6/08/04
54	440c	Flagstaff (KHQP), AZ	A	1181m.s03		HT	6/09/04
55	440d	Kodiak (KHQS), AK	A	1178m.s03		HT	6/09/04
56	440e	Hilo (KHQQ), HI	A	1237m.s03		HT	6/10/04
57	440f	Pago Pago (KHQT)	A	1226m.s03		HT	6/10/04
58	440g	Yap, WCI (KHQV)	A	1241m.s03		HT	6/14/04
59	440h	Barrow (KHQN), AK	A	1182m.s03		HT	6/21/04
450 Series - Tests Require MS Access Program							
60	450	Surface Data 10 Minutes	N/A	N/A		BV	6/10/04
500 Series - Flight Processing and "After Termination" Processing							
61	502	Disk Storage Warning	A			HT	6/10/04
Tests Require Time Changed							
62	402b	Comparison Flight Test	O	N/A		HT	6/22/04
63	410h	Temperature and Height Changes	O	1089.mal 1197.mal		HT	6/21/04
700 Series - Messages Checklist							
64	703	Status Messages Checklist	O	N/A		HT	6/22/04
65	706	Pop-Up Messages Checklist	O	N/A		HT	6/22/04

Attachment 5 - SR&DC Test Checklist RRS System Test – Phase IA

May 24 - July 2, 2004

(Note: User Accounts: A - Site Administrator; O - Observer; T - Trainee)

Test #	TP#	Test Title/Scenario	User Acct	Comments	Init	Date
Installation and Hardware						
65	001	RRS Installation	A	Both systems	SC	5/25
66	002	TRS/CDU Remote Operations	A	Sys 7	KB	5/26
67	003	SPS Communication Status	A	Both systems	SC	5/25
68	004	Offline Utility Suite validation	A	Both systems	SC	5/26
69	501	System Failure/Recovery	O	Sys 7	SC	5/27
70	503	RRS Failure (maint response)	A	Sys 6 **(multiple dates)**	SC	---
Live Flight		*** See **Additional Live Flight Tests** section for more **Live Flight** tests ***				
NOTE: Live flight tests will use NAVMAN radiosondes unless otherwise noted in Comments**.**						
71	403	RWS Termination Above 70hPa	O	Both systs; dual w/LWX	KB	5/27
72	403	RWS Term Above 400/Below 70hPA	O	Sys 6; 17Z	JL	6/9
73	403	RWS Term Below 400hPa	O	Sys 6; Calypso sonde	KB	5/28
74	403	User Term Above 70hPa	O	Sys7; 8/0Z dual w/LWX	KB	6/7
75	403	User Term Above 400/Below 70hPa	O	Sys 6; 12Z dual w/LWX	KB	6/2
76	403	User Term Below 400hPa	O	Sys 6; 12Z dual w/LWX	BV	6/10
77	403	Manual Release Detection	O	Sys 6; 12Z dual w/LWX	KB	6/4
78	403	Multiple releases on same ascension	O	Both systs; 18Z SPL	JL	6/18
79	NA	Different release point	O	Both systs; 17Z	JL	6/9
80	NA	Different launch procedure (6.13.2.2)	O	Both; 12Z dual w/ LWX	BV	6/8
81	403A	Antenna Search Mode Test	O	Sys 6; 12Z dual w/LWX	BV	6/8
82	406	RWS In-flight Operations (Stress Test)	O	Sys 6: 17Z flt	SC	6/7
Flight Rework						

Test #	TP#	Test Title/Scenario	User Acct	Comments	Init	Date
83	413	AWIPS Transmit	O	Sys 7, 17Z flt	JL	6/7
84	404	- Station Data Option 1 - Within 6 hours of selected flight	O	Sys 7, 01/12Z flight reworked on Sys 7	KB	6/1
85	404	- Station Data Option 1 - Not within 6 hours of selected flight	O	Sys 6, 03/12Z flight reworked on Sys 6	BV	6/4
86	404	- Station Data Option 2 - Within 6 hours of selected flight	O	Sys 7, 02/12Z flight reworked on Sys 6	KB	6/2
87	404	- Station Data Option 2 - Not within 6 hours of selected flight	O	Sys 7, 02/12Z flight reworked on Sys 6	KB	6/7
Flight Management and Administration						
88	211	Flight Archive	A	Sys 7	SC	5/28
89	215	Flight Summary	A	Sys 7	SC	5/28
90	233	Master Station Data	A	Sys 7	BV	6/3
91	234	Database Backup and Restore	A	Sys 7	SC	5/27
92	402A	Plots - Overlay	O	Sys 6; dual with LWX	SC	5/27
Documentation & Training						
93	601	Documentation	NA		SC	----
94	602	Training	NA		SC	----
Miscellaneous Tests (annotated as needed)						
95	703	Status Messages	NA	All but 8 seen at SR&DC	KB	6/24
96	705	Misc Software Management	NA			
97	508	ADA	NA	Sys 6; 12Z dual w/LWX	KB	6/21
Additional Live Flight Tests (annotated as needed)						
98	NA	AWIPS Comm Check on Sys 7	O	Both systs; Calypso	KB	5/26
99	403	Test 7; incl reject sonde test in TP 403	O	Both systems	KB	5/28
100	403	Test 7, 12Z	O	Both systs; dual w/LWX	KB	6/1
101	NA	Test 7, 12Z	O	Sys 7; dual with LWX	KB	6/2

Test #	TP#	Test Title/Scenario	User Acct	Comments	Init	Date
102	NA	Test 7, 12Z	O	Both systs; dual w/LWX	KB	6/3
103	NA	Test 11, 12Z	O	Sys 6; dual with LWX	BV	6/4
104	NA	Test 7, 12Z	O	Sys 7; dual with LWX	KB	6/4
105	NA	Test 7, 12Z	O	Both systs; dual w/LWX	SC	6/7
106	NA	Test 7, 17Z	O	Sys 7	KB	6/7
107	406	Test 18, 8/00Z	O	Sys 6; dual w/LWX	KB	6/7
108	NA	Test 16, 17Z (6.13.2.2)	O	Sys 7; dual w/LWX	BV	6/8
109	NA	Test 10, 9/00Z	O	Sys 7; dual w/LWX	KB	6/8
110	NA	Test 7, 9/00Z	O	Sys 6; dual w/LWX	KB	6/8
111	NA	Test 7, 9/12Z	O	Both systs; dual w/LWX	JL	6/9
112	NA	Test 7, 10/00Z	O	Both systs; dual w/LWX	KB	6/9
113	NA	Test 7, 10/12Z	O	Sys 7; dual w/ LWX	BV	6/10
114	NA	Test 7, 11/00Z	O	Both systs; dual w/LWX	KB	6/10
115	NA	Test 7, 14/12Z	O	Both systs; dual w/LWX	KB	6/14
116	NA	Test 7, 14/14Z	O	Both systems	KB	6/14
117	NA	Test 7, 15/00Z	O	Both systs; dual w/LWX	SC	6/14
118	NA	Test 7, 15/12Z	O	Both systs; dual w/LWX	KB	6/15
119	NA	Test 7, 15/14Z	O	Sys 7; dual w/SR&DC; Calypso sonde	KB	6/15
120	NA	Test 9, 16/00Z	O	Sys 7; dual w/LWX	SC	6/15
121	NA	Test 7; 16/12Z	O	Sys 7; dual w/LWX	KB	6/16
122	NA	Test 7; 16/16Z	O	Sys 7	KB	6/16
123	NA	Test 7; 17/00Z	O	Both systs; dual w/LWX	SC	6/16
124	NA	Test 7, 12Z	O	Both systs; dual w/LWX	BV	6/17
125	NA	Test 7, 18/00Z	O	Both systs; dual w/LWX	KB	6/17
126	NA	Test 7, 12Z	O	Both systs; dual w/LWX	JL	6/17

Test #	TP#	Test Title/Scenario	User Acct	Comments	Init	Date
127	NA	Test 7, 19/00Z	O	Both systs;	KB	6/18
128	NA	Test 7, 12Z	O	Sys 7; dual w/LWX	KB	6/21
129	NA	Test 11, 17Z	O	Sys 6	KB	6/21
130	NA	Test 7, 17Z	O	Sys 7	KB	6/21
131	NA	Test 7, 23Z (COR msgs: 22/00Z)	O	Both systs; dual w/LWX	SC	6/21
132	NA	Test 7, 12Z	O	Both systs; dual w/LWX	KB	6/22
133	NA	Test 7, 16Z	O	Both systems	KB	6/22
134	NA	Test 7, 23/00Z	O	Both systs; dual w/LWX	SC	6/22
135	NA	Test 7, 12Z	O	Both systs; dual w/LWX	KB	6/23
136	NA	Test 7, 17Z	O	Both systs	KB	6/23
137	NA	Test 7, 00Z	O	Both systs	SC	6/23
138	NA	Test 7, 11Z	O	Both systs	BV	6/24
139	NA	Test 6, 15Z	O	Sys 6	BV	6/24
140	NA	Test 7, 15Z	O	Sys 7	BV	6/24
141	NA	Test 7, 25/00Z	O	Both systs; dual w/LWX	KB	6/24

Attachment 6 - Original RRS System Live Flight Schedule for Phase IA

5/24 - 7/2/04

(first shift: 6:00-14:30EST second shift: 14:30-22:00EST)

week	SR&DC facility Live Flights			Comments
	Daily flights including rework	Weekly		
		Syn	Spe	
5/24 - 5/28	1 Special @15UTC	0	3	1) ST Phase IA Test Readiness Review will be conducted on Mon at 9:00am 2) Installation and checkout will be performed on the WSH system on 5/24 afternoon. 3) Installation and checkout will be performed on the SR&DC system on 5/25. 4) A Test flight will be conducted on Wed. 5) Special flights (dual with LWX) on Thurs and Friday
6/1 - 6/4	4 Synoptic @12UTC	4	0	Dual Synoptic flights start on 6/1
6/7 - 6/11	2 Synoptic @00UTC, 12UTC 1 Special @15UTC	10	5	
6/14 - 6/18	2 Synoptic @00UTC, 12UTC 1 Special @18UTC	10	5	
6/21 - 6/25	48 hours test	10	15	48 hours stress test (flight every 3 hours starting Mon 7am thru Wed 7am) Thurs- 1 Syn/1 Special Fri - 2 Syn/1 Special
6/28 - 7/2	2 Synoptic @00UTC, 12UTC Special @18UTC	8	4	No flights on Friday

NOTE:

(1) Special flights for Thursdays will be in the morning instead of in the afternoon.

(2) All Synoptic flights are dual flights with LWX forecast office.

(2) Rework will be performed on live flights as time permits throughout ST Phase IA.

(3) Weekly TRG will be held every Thursday at 1pm. Conference calls will be set up for this meeting.

Attachment 7 - Live Flight Test Log
RRS System Test Phase IA

System 6 (Station Identification: 69991)

* Note: For ease of readability, non-valid flights are identified by a blank rather than by "No."

SR&DC Test #	RWS Flt #	Date	Release Hour (UTC)	Valid Yes/ No*	Reached 400 hPa	Reached 10 hPa	Term hPa	Term Alt (m)	Term Range (km)	Flt Time (min)	Term Reason	ST Test #
1175	200	5/26	19Z		Yes	Yes	9.34		93.6		13	N/A
1176	201	5/27	17Z	Yes	Yes	No	10.21		111.2		1	7, 28
1177	202	5/28	14Z		No	No	991.00	119	0.025	0.12	8	9
1178	203	5/28	17Z	Yes	Yes	No	12.13	29979	109.0	98.50	1	38 (7)
1180	204	6/1	12Z	Yes	Yes	No	11.79	30192	104.7	100.93	1	39 (7)
1181	205	6/2	12Z		Yes	No	261.03	10304	59.3	40.57	13	11
1182	206	6/3	12Z	Yes	Yes	No	16.52	28002	78.2	95.53	1	41 (7)
1184	207	6/4	12Z		Yes	No	396.07	7538	12.9	28.28	13	13, 42 (11)
1186	208	6/7	12Z	Yes	Yes	No	12.10	30044	41.2	102.13	1	44 (7)
1187	209	6/7	17Z		Yes	No	199.29	12263	16.3	37.48	9	18
1188	210	6/8	00Z	Yes	Yes	Yes	9.98	31362	43.0	111.95	1	46 (18)
1189	211	6/8	12Z	Yes	Yes	No	10.59	N/A	38.6	106.83	9	16, 17
1190	fault	insert										

SR&DC Test #	RWS Flt #	Date	Release Hour (UTC)	Valid Yes/ No*	Reached 400 hPa	Reached 10 hPa	Term hPa	Term Alt (m)	Term Range (km)	Flt Time (min)	Term Reason	ST Test #
1191	212	6/9	00Z	Yes	Yes	Yes	9.74	31566	37.88	118.73	1	49 (7)
1192	213	6/9	12Z	Yes	Yes	No	10.72	30923	33.49	107.60	1	50 (7)
	214	6/9	TEST/data analysis by Nick/Bob T.									
1193	215	6/9	17Z	No	Yes	No	190.02	12653	15.4	42.45	9	8, 15
1194	216	6/10	00Z	Yes	Yes	No	13.78	29204	32.9	102.73	9	51 (7)
1195	217	6/10	12Z	Yes	No	No	447.10	6697	13.2	22.97	13	52 (7)
1196	218	6/11	00Z	Yes	Yes	No	11.823	30242	59.1	102.75	1	53 (7)
1197	219	6/14	12Z	Yes	Yes	No	13.66	29321	40.5	94.78	1	54 (7)
1198	220	6/14	14Z	Yes	Yes	Yes	8.96	32265	41.1	105.27	1	55 (7)
1200	221	6/15	00Z	Yes	Yes	No	12.27	30060	54.1	100.07	1	56 (7)
1201	222	6/15	12Z	Yes	Yes	Yes	9.53	31765	43.3	111.18	1	57 (7)
1207	223	6/17	00Z	Yes	Yes	Yes	8.72	32327	37.8	119.92	1	62 (7)
1208	224	6/17	12Z	Yes	Yes	No	10.99	30857	41.8	101.58	1	63 (7)
1209	225	6/18	00Z	Yes	Yes	No	13.04	29611	42.9	103.88	1	64 (7)
1210	226	6/18	12Z	Yes	Yes	Yes	9.06	32104	52.3	110.97	1	65 (7)
1211	227	6/18	18Z	Yes	Yes	No	10.62	32241	N/A	104.45	1	14
1212	228	6/19	00Z	Yes	Yes	Yes	9.20	32032	52.4	113.55	1	66 (7)

SR&DC Test #	RWS Flt #	Date	Release Hour (UTC)	Valid Yes/ No*	Reached 400 hPa	Reached 10 hPa	Term hPa	Term Alt (m)	Term Range (km)	Flt Time (min)	Term Reason	ST Test #
1213	229	6/21	12Z	Yes	Yes	No	11.53	30481	96.0	110.12	1	33
1214	230	6/21	17Z		Yes	No	94.33	16853	79.8	60.97	13	68 (11)
1215	231	6/21	23Z	Yes	Yes	No	10.75	30973	83.3	106.20	1	70 (7)
1216	232	6/22	12Z	Yes	Yes	No	10.12	31426	75.0	108.20	1	71 (7)
1217	233	6/22	16Z	Yes	Yes	Yes	8.93	32327	64.1	101.70	1	72 (7)
1218	235	6/23	00Z	Yes	Yes	No	10.45	31231	79.4	114.38	1	73 (7)
1219	236	6/23	12Z	Yes	Yes	No	12.47	30006	85.7	102.73	1	74 (7)
1220	237	6/23	17Z	Yes	Yes	No	11.35	30666	81.3	100.07	1	75 (7)
1221	238	6/24	00Z	Yes	Yes	Yes	8.87	32393	87.1	111.70	1	76 (7)
1222	239	6/24	11Z	Yes	Yes	No	16.99	27985	90.6	95.95	1	77 (7)
1223	240	6/24	15Z		Yes	No	333.08	8831	23.1	31.05	9	78 (6)
1224	241	6/25	00Z	Yes	Yes	Yes	9.99	31517	73.8	107.45	1	80 (7)

System 7 (Station Identification:69990)

SR&DC Test #	RWS Flt #	Date	Release Hour (UTC)	Valid Yes/ No*	Reached 400 hPa	Reached 10 hPa	Term Lvl (hPa)	Term Alt (m)	Term Range (km)	Flt Time (min)	Term Reason	ST Test #
1175	201	5/26	19Z	Yes	Yes	Yes	9.33		93.6		9	Comm Tst
1176	205	5/27	17Z	Yes	Yes	No	10.21		111.2		1	7
1178	206	5/28	17Z	Yes	Yes	No	12.13	29979	109.0	98.50	1	38 (7)
1180	207	6/1	12Z	Yes	Yes	No	11.79	30194	104.7	100.93	1	39 (7)
1181	208	6/2	12Z	Yes	Yes	No	17.61	27551	95.8	97.73	1	40 (7)
1182	209	6/3	12Z	Yes	Yes	No	16.52	28003	78.2	95.53	1	41 (7)
1184	210	6/4	12Z	Yes	Yes	No	10.94	30787	49.6	106.65	1	43 (7)
1186	211	6/7	12Z	Yes	Yes	No	12.10	30045	41.2	103.13	1	44 (7)
1187	212	6/7	17Z	Yes	Yes	No	12.88	29633	35.6	93.43	9	45 (7)
1188	213	6/8	00Z		Yes	No	20.89	26403	37.4	95.82	13	10
1189	214	6/8	12Z	Yes	Yes	No	10.87	30832	38.2	105.87	1	16
1190	215	6/8	17Z	Yes	Yes	Yes	9.69	31645	35.8	104.05	1	47 (16)
1191	216	6/9	00Z		Yes	No	49.97	20859	21.19	84.35	13	48 (10)
1192	217	6/9	12Z	Yes	Yes	No	10.72	30921	33.49	107.60	1	50 (7)
1193	218	6/9	17Z	Yes	Yes	No	11.45	30512	31.2	96.88	1	15
1194	219	6/10	00Z	Yes	Yes	Yes	9.19	31982	35.2	112.08	1	51 (7)

SR&DC Test #	RWS Flt #	Date	Release Hour (UTC)	Valid Yes/ No*	Reached 400 hPa	Reached 10 hPa	Term Lvl (hPa)	Term Alt (m)	Term Range (km)	Flt Time (min)	Term Reason	ST Test #
1195	220	6/10	12Z	Yes	Yes	No	12.46	29872	39.1	102.18	1	52 (7)
1196	221	6/11	00Z	Yes	Yes	No	11.82	30244	59.1	102.77	1	53 (7)
1197	222	6/14	12Z	Yes	Yes	No	13.67	29320	40.5	94.78	1	54 (7)
1198	223	6/14	14Z	Yes	Yes	Yes	8.96	32266	41.1	105.27	1	55 (7)
1200	224	6/15	00Z	Yes	Yes	No	12.27	30060	54.1	100.07	1	56 (7)
1201	225	6/15	12Z	Yes	Yes	Yes	9.53	31765	43.3	111.18	1	57 (7)
2202	226	6/15	14Z	Yes	Yes	No	10.22	31327	40.6	107.98	1	58 (7)
1205	227	6/16	00Z	Yes	No	No	912.02	963	2.3	3.78	3	59 (9)
1206	228	6/16	12Z	Yes	Yes	No	11.52	30479	39.0	103.78	1	60 (7)
1204	229	6/16	16Z	Yes	Yes	No	10.22	31328	35.1	101.37	1	61 (7)
1207	230	6/17	00Z	Yes	Yes	Yes	8.72	32327	37.8	119.92	1	62 (7)
1208	231	6/17	12Z	Yes	Yes	No	10.99	30859	41.8	101.58	1	63 (7)
1209	232	6/18	00Z	Yes	Yes	No	13.04	29611	42.9	103.87	1	64 (7)
1210	233	6/18	12Z	Yes	Yes	Yes	9.06	32111	52.3	110.98	1	65 (7)
1211	234	6/18	18Z	Yes	Yes	No	10.62	31149	55.6	104.45	1	14
1212	235	6/19	00Z	Yes	Yes	Yes	9.20	32032	52.4	113.53	1	66 (7)
1213	236	6/21	12Z	Yes	Yes	No	11.53	30480	96.0	110.12	1	67 (7)

SR&DC Test #	RWS Flt #	Date	Release Hour (UTC)	Valid Yes/ No*	Reached 400 hPa	Reached 10 hPa	Term Lvl (hPa)	Term Alt (m)	Term Range (km)	Flt Time (min)	Term Reason	ST Test #
1214	237	6/21	17Z	Yes	Yes	Yes	8.45	32713	76.0	106.45	1	69 (7)
1215	238	6/21	23Z	Yes	Yes	No	10.74	30978	83.3	108.40	1	70 (7)
1216	239	6/22	12Z	Yes	Yes	No	10.12	31425	75.0	108.20	1	71 (7)
1217	240	6/22	16Z	Yes	Yes	Yes	8.93	32327	64.1	101.70	1	72 (7)
1218	241	6/23	00Z	Yes	Yes	No	10.45	31230	79.4	114.38	1	73 (7)
1219	242	6/23	12Z	Yes	Yes	No	12.46	30011	85.7	102.75	1	74 (7)
1220	243	6/23	17Z	Yes	Yes	No	11.35	30664	81.3	100.05	1	75 (7)
1221	244	6/24	00Z	Yes	Yes	Yes	8.87	32393	87.1	111.70	1	76 (7)
1222	245	6/24	11Z	Yes	Yes	No	16.99	27985	90.6	95.95	1	77 (7)
1223	246	6/24	15Z	Yes	Yes	Yes	9.30	32048	77.9	103.00	1	79 (7)
1224	247	6/25	00Z	Yes	Yes	Yes	9.99	31517	73.8	107.45	1	80 (7)

Attachment 8 - SR&DC Balloon Release Points
(Points and Coordinates used at the Start of ST Phase IA)

WGS84 - Geographical Coordinates

Point #	Latitude	Longitude	WGS-84	Geoid Height (m)	4 feet (1.2192 m) Above MSL Height (m)	Center Point of the TRS (m) 49.2 inches (1.24968 m)	Release Point Pressure Correction
1	N 38˚58'36.04033" (38.976677869)	W 77˚28'37.12633"	50.685	33.12	85.0242	NA	0.6
2	N 38˚58'37.97226" (38.97721451)	W 77˚28'37.30152" (-77.4770282)	54.823	33.12	87.943 Top of snout of TRS straight up	86.69332	NA
3	N 38˚58'37.91745" (38.977199291)	W 77˚28'37.80453" (-77.477167925)	51.553	33.12	85.8922	NA	0.5
4	N 38˚58'38.01504" (38.9772264)	W 77˚28'36.80257" (-77.476889602)	51.167	33.12	85.5062	NA	0.5
5	N 38˚58'41.65919" (38.978238663)	W 77˚28'38.04166" (-77.47723379)	56.074	33.12	89.194 Top of snout of TRS straight up	87.94432	NA
6	N 38˚58'41.5818" (38.9782171)	W 77˚28'38.54345" (-77.477373180)	54.742	33.12	89.0812	NA	0.1
7	N 38˚58'41.67575" (38.978243263)	W 77˚28'37.53846" (-77.4770940)	52.093	33.12	86.4322	NA	0.4
8	N 38 58 42.28506" (38.97841251)	W 77 28 36.20347" (-77.476723186)	52.502	33.12	86.8412	NA	0.4
USNO	N 38˚55'08.26460"	W 77˚03'58.40494"	48.878	33.12	81.998	NA	NA
BLDG 16 Baseline Stand	NA	NA			89.89908	NA	NA

Notes:

Height of the GPS egg above the center point of TRS 6 is 84 inches (2.1336 m)
Height of the GPS egg above the center point of TRS 7 is 82 inches (2.0828 m)

Point 1: Launch point (ground level) at the 10 meters east of the highbay. Marked by orange paint on the ground.

Point 2: The center of the end plate of the TRS #7 scanner assembly with the TRS at 0 degrees azimuth and 90 degrees elevation. (can be corrected to TRS point of rotation if horizontal and vertical offsets are known)

Point 3: Launch point (ground level) 10 meters west of TRS #7. Marked by wood stake in ground.

Point 4: Launch point (ground level) 10 meters east of TRS #7. Marked by wood stake in the ground.

Point 5: The center of the end plate of the TRS #6 scanner assembly with the TRS at 0 degrees azimuth and 90 degrees elevation. (can be corrected to TRS point of rotation if horizontal and vertical offsets are known)

Point 6: Launch point (ground level) 10 meters west of TRS #6. Marked by wood stake in ground.

Point 7: Launch Point (ground level) 10 meters east of TRS #6. Marked by wood stake in ground.

Point 8: Launch Point approximately 100 feet northeast of TRS #6.

USNO is the U.S. Naval Observatory CORS site used for the processing.

Attachment 9 - Regional Maintenance Specialist and Caribou WFO Summary

Region	RMS	LRU Ordered and/or Replaced	Induced Faults	Comments
Eastern	Brian Campbell	Motion Control Unit (MRU)	(1) Defective fiber optic cable (2) Defective SPS cable (3) Defective Low Noise Amplifier (LNA)**	Power Outage Occurred*
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Caribou WFO	William Desjardins	NA	(1) Bad LCDU coefficients	Only present for two days
Southern	Charlie Lake	Signal Processing Subsystem (SPS)	(1) Defective fiber optic cable (2) Defective External Hard Drive (3) Faulty Intercom cable in radome (4) Defective TRS/RWS cable	
Central	Michael J. Ford	RRS Workstation Subsystem (RWS)	(1) A bad GPS coaxial cable	There were two real RSOIS problems during the week which the RMS resolved.

Region	RMS	LRU Ordered and/or Replaced	Induced Faults	Comments
Western	George Montenegro		(1) Intermittent Console Display Unit (CDU) problem (2) Defective RSOIS (3) SPS Timeout	No items were ordered from NLSC as SR&DC had a defective CDU which was swapped out.

* During the ST IA, there was a real power outage at SR&DC in which the backup generators did not activate. Brian Campbell assisted LWX in restoring their MicroArt system in time for their 00Z sounding.

** This was a specially induced fault inserted by OPS11 for the strict purpose of determining if there was any way to detect this type of problem. Currently, there is no way to detect a defective LNA. OPS11 is working with InterMet to devise a means of detecting and isolating the problem.

Attachment 10 - RRS Subsystem Components vs SRS vs SIRs

Subsystem Component	SRS Paragraph	SIRs	SIR Summary
Not Selected/Blank		2324 I1/P2	RRS Does Not Comply With NWSM 30-4106 (Listed as documentation)
		2327 I1/P2	RRS Technical Manuals Not Easily Usable For Troubleshooting System Problems (Documentation)
	6.7.2.8.2.1	2361 I4/P2	Sys 6: Multiple Status Code 8 & 10 messages in Status Messages Display
	5.1.2.4 5.1.2.5.3	2382 I1P2	Erratic Radiosonde Temperature (Hardware - radiosonde)
	5.2.11.1	2385 I3/P2	No wind data with 5-7 matching satellites (SPS hardware/firmware problem)
		2387 I1/P3	Americans with Disabilities Act (ADA): Windows accessibility features deficient
	6.8.5	2398 I2/P2	No “Commit” message in Rework
TRS Pedestal/Cabinet		2375 I2/P2	SPS Removal and Replacement Problem (Hardware problem)
Workstation	6.1.1	2353 I5/P3	Blue screen of death on System 7 (Hardware, possibly Windows Operating System-one time occurrence)
Admin Functions/Utilities	6.8.9	2300 I4/P2	Import Progress Bar after installation
	5.2.12.1	2303 I2/P2	Do not check for backup dir status during the flight
	4.2.2	2391 I1/P2	Unable to Rework short flight
	4.19.1	2418 I2/P2	Calculating the averages for multiple flights in flight summary
		2428 I3/P3	Improving the Capture utility...
Preflight Operations	6.8.5	2322 I4/P2	Status Message: "TRS is reporting a critical equipment failure"

Subsystem Component	SRS Paragraph	SIRs	SIR Summary
	6.1.1	2350 I5/P2	Surface Dewpoint Temperature Label 'wraps' in Preflight Display
	5.1.2.5.3 6.7.1.3.2 6.7.3.4.1 6.7.3.4.3	2358 I5/P4	Received Unknown Database error after second release was aborted
	4.7 6.7.1.3.3.4	2399 I4/P2	Pre-set balloon info in Preflight should be updated
	6.7.1.4.6.1. 6.7.1.4.6.2	2401 I2/P2	System 6 Generates Previous Temperature; System 7 Doesn't
Release, Launch, Tracking	4.6	2349 I3/P3	Term Level in Preflight Keeps Non-Zero Value When Flight Changed To Synoptic
Data Processing	4.6 6.8.6	2299 I4/P2	Validating Change Termination Time
	6.7.2.9.1	2303 I2/P2	No check message for strong super-adiabat off surface
	5.1.2.3.2	2307 I3/P2	Pressure data outlier removal needs work
	6.8.6	2309 I3/P2	S/W slow when changing termination time
	5.1.3.6.1	2312 I2/P2	RWS Detected Burst Early and ability to extend termination point
	5.1.4.1.4	2329 I1/P2	Change in TTBB content when termination time changed and then restored
	5.1.3.5.4	2330 I1/P2	Data missing beyond one minute was filled with bogus interpolated data
	5.1.3.5.4	2332 I1/P2	Bogus interpolated data appearing in the PDS and WMO levels table
	Handbook 3	2336 I1/P2	Bogus mixing ratios generated when RH missing
	4.24.1	2344 I4/P3	PDS window in Restore size after edits applied

Subsystem Component	SRS Paragraph	SIRs	SIR Summary
	4.8	2359 I1/P1	S/W failure when change in sfc pressure made
	6.1.3	2369 I4/P2	Change Termination Time Out of Limit Popup Inconsistent
	5.1.3.6.1	2373 I1/P2	Leaking or Floating Balloon Algorithm Appears to be Too Sensitive
	6.7.2.9.1	2389 I4/P2	Required Check Message Was Not Displayed (Closed)
	6.7.2.9.1	2392 I4/P2	RWS did not generate the required check messages (**Closed**)
	6.7.2.2.1	2403 I1/P2	Station pressure rather than Release point pressure used for pressure at time 0.0
	4.5 5.1.4.1.6	2406 I1/P2	TTDD message content changes when unneeded 12 hour previous temp entered
		2412 I1/P2	NCEP detects more Supers above 100 mb with RRS than with MicroART
Plots and Tabular Displays	6.7.2.12.4	2319 I4/P3	Overlay Plot line connecting cross marks are only displayed for previous flights
	6.7.2.5.2	2321 I3/P2	Observer cannot mark wind speed and direction cells in Processed Tabular Display (Closed)
	6.7.2.12.1	2343 I4/P3	Plot Overlay Problem from Flight With Missing Data
	6.3.2 6.7.2.11.1	2352 I3/P3	Temp Plot Shows Large Gap In Plotted Raw Temp Data
	6.1.1	2367 I4/P2	PDS in 60-second config shows Elapsed Time with non-zero decimal places
		2368 I4/P3	Automatic Opening and Closing of PDS when Applying User Edits is Not Consistent
	6.3.2 6.7.2.11.1	2374 I3/P5	Wind data discrepancies between Plots and PDS and between Post-termination and Rework
	6.1.1	2400 I4/P2	Editable PDS columns not shown as editable in the PDS Configuration menu

Subsystem Component	SRS Paragraph	SIRs	SIR Summary
Levels Selection	5.1.3.1.1 Handbook 3	2301 I1/P2	No Trop Selected
	Handbook 3	2304 I1/P2	1000 mb coded in TTAA and TTBB but with different dewpoint depression (**Closed**)
	5.1.3.6.1	2305 I1/P2	Balloon Burst Algorithm still does not work
	5.1.4.1.4 5.1.4.1.6	2306 I1/P2	No significant temperature selected
	Handbook 3	2310 I1/P2	Standard Pressure Level coded in TTBB, but not in TTAA
	5.1.3.1.1	2315 I1/P2	Second Trop not selected
	Handbook 3	2316 I1/P2	Max wind not coded with user termination of flight
	4.5 5.1.4.1.1	2318 I1/P2	Missing winds groups in PPBB/PPDD messages when winds are not missing
	5.1.4.1.4 5.1.4.1.6	2320 I1/P2	Not all temperature sig levels selected (**Closed**)
	6.8.6	2335 I1/P2	Unable to restore termination time to origional value after changes made
	4.8 Handbook 3	2337 I1/P2	When sfc pressure equals standard pressure level, data inconsistencies result
	4.20 Handbook 3	2338 I1/P2	Freezing levels selected differ significantly from MicroART (**Closed**)
	4.11	2340 I1/P2	Missing RH/Dew point level in WMO levels table, but not in PDS table
	6.7.2.9.1.h	2348 I5/P2	Check Message "There is no level within 20 mb of the surface" was not displayed (**Closed**)
	Handbook 3	2360 I3/P2	Deletion of wind data does not eliminate max wind level
	4.20 Handbook 3	2363 I1/P2	Freezing levels not selected correctly

Subsystem Component	SRS Paragraph	SIRs	SIR Summary
	6.7.2.9.1	2364 I3/P5	Check Msg says missing mandatory level at 9mb, but level exists in PDS & levels tables (**Closed**)
	4.20 5.1.4.1.7 6.7.2.10.4	2365 I1/P2	RADAT still coded when flight terminates just above freezing level
	Handbook 3	2371 I1/P2	If termination time set to standard pressure level, that press level is not coded
	4.11.1 5.1.3.1.1	2378 I1/P2	Wind levels coded out of sequence
	4.5	2381 I1/P2	Incorrect coding of missing data around 100 mb
	4.5 4.11.1	2384 I1/P2	Coding of calm winds not consistent in WMO levels table and messages (**Closed**)
	4.5 4.11.1	2386 I1/P2	Missing winds throughout flight coded as "00000" in coded messages (**Closed**)
	4.2.2	2390 I1/P2	Unstable wind level selection while in rework
	4.5	2402 I1/P2	Content change in TTDD message after release time changed & restored
	4.5	2404 I1/P2	Deletion/restoration of PTU data causes change in TTBB message content
	5.1.3.1.1	2424 I1/P2	No tropopause level selected when sfc pressure is less than 850 mb
Message Coding	4.5	2311 I2/P2	PPDD Product had a colon in a data group
	4.5	2355 I3/P2	WMO levels table and the Coded message contain different Height for 1000 and 850
	4.5	2379 I1/P2	Showalter Index not coded correctly when index is negative
	4.5	2393 I4/P2	Observer Unable to View Entire Coded Message Display

Subsystem Component	SRS Paragraph	SIRs	SIR Summary
	4.5 6.7.2.10.3	2395 I4/P2	Unable to Turn On Audible Alert on WMO Coded Messages Display (**Closed**)
	5.1.1.3.5.1	2396 I2/P2	Unable to change a Special Flight to Synoptic (**Closed**)
	5.1.4.1.6	2411 I1/P2	No significant levels above 100 hPa were coded
	6.7.2.9.1	2414 I1/P2	No check message for strong super-adiabatic lapse rate in stratosphere
Product Transmission	4.5.2 5.1.4.1.2	2317 I2/P2	FZL, MAN, and SIG Incorrectly Displayed with COR Headers
	4.18.1 6.8.6	2342 I4/P3	Product transmit messages disappear from Status Message window
Archive and Backup	4.23 5.1.4.2.1	2416 I1/P2	NCDC archive: Levels with elapsed time problems (**Closed**)
	4.23 5.1.4.2.1	2420 I1/P2	NCDC Archive: Two consecutive levels have the same elapsed minute and second, but different data (**Closed**)
	4.23 5.1.4.2.1	2421 I1/P2	NCDC Archive: Regional Wind and sig wind selected 1 meter apart (**Closed**)
	4.23 5.1.4.2.1	2422 I1/P2	NCDC Archive: Change in termination time causes thick layer of "99999's" after the term time
	4.23 5.1.4.2.1	2427 I1/P2	NCDC Archive: Differences in the archive data levels collected from both systems (**Closed**)
Other	6.4	2298 I1/P2	Fatal Error during Installation
	5.1.1.3.5.8 5.1.1.3.5.9	2308 I1/P2	Selecting to rerun another flight with the same ascension number takes you to SIMULATED MODE
	4.19.1	2314 I3/P2	Different Flight Summary (Raw Data) Values in Rework & Offline Modes
	4.24.1 6.3 6.7.2.7.3	2323 I2/P2	With PDS in 60-sec resolution, other displays show loss of comms

Subsystem Component	SRS Paragraph	SIRs	SIR Summary
	4.24.1 6.7.2.7.3	2325 I3/P3	With PDS in 60-sec resolution, Processed Bar shows 999 for wind data
		2326 I3/P3	TRS 7 Took 9 Minutes Longer To Warm-up and Initialize than TRS 6 (Closed - within spec)
	EHB 9-901; 9-903	2328 I4/P2	RRS Unique Tool Kit Lacking Needed Tools (Listed as documentation because of OPS12, but really is hardware)
	4.19.1 6.7.2.7	2347 I2/P2	Flight Summary has termination pressure as N/A but WMO levels indicated an actual pressure value
	6.4.1.1	2356 I2/P2	Update RWS with correct Station Lat and Log values for 69990 and 69991
	6.1.1	2362 I4/P2	"Error 1706: No valid source code could be found for product RWS ... "
	6.7.2.8.2.2	2374 I4/P2	Status Message Display Not Recording Time UPS Turned Off
	6.7.2.13	2394 I5/P5	Slant Range versus Arc Distance - Question (**Closed**)
	6.1.1	2397 I1/P2	RWS displays confusing options when user selects Flight/Exit during flight
	5.1.3.6.1	2407 I2/P3	System Incorrectly Terminated for Radiosonde Failure
	6.4.1.1	2415 I4/P2	Add the Caribou test system to the Master station data
Radiosonde	6.7.1.4.3	2354 I3/P5	Rejected sonde due to bad temp and RH (Hardware - radiosonde)
	5.1.3.1	2357 I1/P2	Bogus 1% RH values aloft
	6.7.1.4.3	2380 I1/P2	Radiosode Pressure Sensor problems (Hardware - radiosonde)
TRS		2408 I2/P2	TRS IDD Needs to be Taught at NWSTC (Documentation)

Subsystem Component	SRS Paragraph	SIRs	SIR Summary
SPS		2383 I2/P2	EHB9-801, SPS Remove and Replacement, does not include steps to check the firmware version (Documentation)
Software	6.2.3.2	2346 I2/P2	Applying Critical Operating System Updates to RWS (Documentation - procedures needed)
OMS/OBIT	5.2.11.2	2345 I4/P2	Unable to Terminate OBIT TRS Heater Test (Documentation - Closed)
	5.2.11.1	2376 I2/P2	Unable to run SPS tests using OMS (Both hardware and documentation)
	5.2.11.2	2425 I1/P2	Unable to Isolate Scanner Assemble Fault (Both hardware and documentaiton)
	5.2.11.1 5.2.11.2	2426 I4/P2	OBIT functionality
Indeterminate		2388 I3/P2	EHB comments from Regional Maintenance Specialist (Documentation)

Attachment 11 - Summary of RWS Algorithms and Message Coding Evaluation

SIR	Impact	Priority	Brief Description
Algorithms Needing work			
2305 2312	1 2	2 (Both)	Balloon Burst (too early)
2373	1	2	Floating balloon (too sensitive)
2307	3	2	Pressure outlier removal above about 20 hPa (random rejection of data)
2301 2315 2424	1 (All)	2 (All)	Tropopause selection (not coding it or not coding second trop)
2379	1	2	Showalter index (does not code correctly if negative or when pressure is <850 mb)
2338 2363 2365	1 (All)	2 (All)	RADAT (not selecting freezing levels correctly or when flight ends before 400 hPa)
2101 2185	2 1	2 (Both)	Solar radiation correction (just off surface and when ascension rate = zero)
2303 2414	2 1	2 (Both)	Check messages for super-adiabatic lapse rates (not appearing when they should)
2239	3	3	No data plausibility checks or automated flight term if the pressure <2.0 hPa or height is >45,000 meters
2330	1	2	Interpolated data (bogus values)
2332	1	2	Bogus data in the PDS and WMO Levels tables
2336	1	2	Mixing ratios (bogus values)
2337	1	2	Data inconsistencies when surface pressure equals standard pressure level
2390	1	2	Wind selection while in Rework Mode (unstable winds)
2391	1	2	Unable to rework short flights
2403	1	2	Baseline pressure selection (wrong pressure being used)
WMO Messages, Archive and Flight Summary			

SIR	Impact	Priority	Brief Description
2390 2402 2406	1 (All)	2 (All)	WMO levels non-repeatability (This occurs when data is reworked and when pre-release or flight data edited and then restored to the original values in post-flight.)
2318 2378 2381	1 (All)	2(All)	Coding of winds around 100 hPa (Coding missing data when it's not missing, heights coded out of sequence, and regional wind not coded.)
2304 2310	1 (Both)	2 (Both)	Coding of two standard pressure levels (one appearing in the TTAA, the other in the TTBB) with different data
2205 2411	1 (Both)	2 (Both)	Occasional problem with significant temperatures above 100 hPa not being selected
2311	2	2	Punctuation marks appearing in the coded message groups
2360	3	3	Deletion of winds does not cause Max wind levels to be deleted
2371	1	2	Last standard pressure level not coded when flight terminates at standard pressure level
2277 2378	3 1	2 (Both)	Archive levels coded out of sequence
2280 2293	3 (Both)	2 (Both)	Archive data rounding problems cause erroneous data
2441	2	3	Duplicate archive levels (Note: This “problem” was considered acceptable by the RRS CCB and the CCB determined users should be notified of the differences between RRS observation products and MicroART’s products.)
2418	2	2	"N/A" is assigned as a zero and used to calculate flight summary statistics
2240	1	2	No coding of standard pressure levels above 5 hPa
2320	1	2	All significant temperature levels are not selected
2316	1	2	Maximum winds are not coded
2384	1	2	Coding of Calm Winds not consistent between WMO Levels table and messages
2386	1	2	Mission winds are coded as “00000" in messages
2420	1	2	NCDC Archive: Two consecutive levels have same time stamp, but different data
2421	1	2	NCDC Archive: Regional wind and a significant wind selected one meter apart

SIR	Impact	Priority	Brief Description
2347	2	2	Flight Summary has "NA" for termination pressure when the WMO Levels table shows a value
Radiosonde Problems			
2354	3	5	Temperature and relative humidity senor problems
2357	1	2	Layers of bogus 1% RH aloft (i.e., dry bias)
2380	1	2	Pressure sensor problems
2382	1	2	Very erratic Temperatures above 100 hPa

Attachment 12 - EMRS Reports Written

Date	RRS Subsystem	Summary
5/25/04	TRS	RRS System 6 CDU coefficients have wrong value.
5/25/04	RWS	Fatal Error encountered during test. RWS was suspended for 2 hrs. Performed initial installation and reinstall RWS software, including scan disk and MS 2000 critical updates. RWS was back to operational at 10:30.
5/26/04	TRS	RRS System 7 - While verifying the TRS coefficients for the RCDU, found a bad value. Reset to factory recommended value.
5/28/04	Radiosonde	Radiosonde rejected--could not baseline. Bad out of the box.
5/28/04	Radiosonde	Radiosonde was baselined, but there were no GPS winds. Faulty Radiosonde.
6/01/04	TRS	3.5 mm captive nut stripped out on RRS System 6 TRS rack.
6/02/04	TRS	While checking the TRS coefficients for the Motion Control Unit, found the value of cma on SR&DC System 6 wrong. Entered the correct value of 88 per direction of John Monte.
6/07/04	RSOIS	RSOIS did not have power when 12Z synoptic flight started. On coming into the office discovered RSOIS was not working. Entered surface values manually.
6/08/04	RSOIS	HW Status Display had yellow exclaimnation point and code 4xx - No temperature change in the last 30 minutes.
6/08/04	Radiosonde	NAVMAN radiosonde had scraped thermistor - by direction of RRS Program Manager, we were not to reject the radiosonde. (Note: Only one EMRS report was written for the record.)
6/15/04	TRS	After changing the intercom cable in the RRS System 6 radome, lost all communications with the System 6 TRS. Could control the UPS and test the SPS to conclude the fiber cable was working. Checked all connectors on DCE for tightness.
6/23/04	SPS	No GPS for the first three minutes of baseline. Had 7 base satellites, but radiosonde had 0 - lost GPS. GPS then started dropping in and out. OPS11 suspects a SPS firmware problem.

Attachment 13 - RRS SIRs Reported at the WFO Caribou, Maine

SIR	Impact	Priority	Summary	Status
2058	2	2	No sig temps selected above 100 mb in rework	OPEN
2059	2	2	Lower height coded off sfc	OPEN
2060	2	2	Possible RH Sensor error	OPEN
2061	2	2	Surface observation does not match PDS and WMO levels	OPEN
2063	2	2	Duplicate pressure levels at SFC in TTBB	OPEN
2064	2	2	No audible alarm with missing PTU	CLOSED
2066	2	2	Max Wind problem?	OPEN
2071	2	2	RWS User Administration	CLOSED
2074	2	2	No GPS after release	OPEN
2077	2	2	After Termination Sequence	OPEN
2078	1	1	RWS Workstation Ghosting Instructions	CLOSED
2079	2	2	RWS Search Routine	OPEN
2080	1	1	AFC frequency Drifting	OPEN
2081	2	2	Menu Items were disabled	OPEN
2082	2	2	AFC Frequency Drifting	OPEN
2083	2	2	Status and Check Messages	OPEN
2086	1	1	Post Termination - Closing RWS	OPEN
2090	2	2	No super after changing of sfc temp in Rework	OPEN
2092	2	2	Max wind at flight term not selected	CLOSED
2095	2	2	RH comparison	OPEN
2099	1	1	Missing data Alert Message	CLOSED
2100	2	2	Release Detection wrong when PTU missing at Release	CLOSED
2101	2	2	Temperature edited results in bogus heights/coding	OPEN
2148	2	2	Missing significant Levels above100hPa	OPEN
2150	2	2	Antenna Control	CLOSED

SIR	Impact	Priority	Summary	Status
2155	1	1	RWS Crash on overlay flight	CLOSED
2156	2	2	PDS data interpolated from surface to 843 hPa	CLOSED
2158	2	2	GPS Acquisition	CLOSED
2457	1	5	High RH continues after exit from cloud top	OPEN